



Centerline

July 2000

Issue No. 2

An Environmental News Quarterly, From the NC DOT Natural Systems Unit

Centerline Viewpoint

**By: William D. Gilmore, Manager
Project Development & Environmental
Analysis Branch**

Bgilmore@dot.state.nc.us



Through a series of "prayer sessions," NCDOT senior management, facilitated by the Southern Resource Center (SRC) of the Federal Highway Administration, has taken us down a road of self-examination. Senior DOT staff were pressed to investigate our environmental ethic. Were we doing the right thing?

To find out we sent a questionnaire to our staff and asked them how we felt the agencies viewed our environmental performance. A similar questionnaire was also sent to several agencies to ask them how they saw PDEA. In some cases the agencies actually rated the environmental ethic at PDEA better than we rated ourselves, others did not wish to respond. What does this tell us?

Considering where the Department was two or three years ago, we have come a long way in trying to be more environmentally responsive. Are we there yet? . . . Obviously not. The pressure to maintain project schedules and to keep the public happy is very difficult. What guidance can be offered?

(Viewpoint continued on page 2)

In this issue:

Viewpoint & Stream continued.....	page 2
DNA Research on New Mussels.....	page 3
Full Delivery Mitigation Projects.....	page 4
1999 Annual Monitoring Reports.....	page 4
Conducting Mussel Surveys.	page 5
Unique Section 404 Commitments	page 6
Research Project: Fish Migration.....	page 7
Quick Robin—to the Bat Mobile.....	page 8
Employee Spotlight.....	page 9

NCDOT's Stream Restoration Initiatives

By: Ed Lewis

Elewis@dot.state.nc.us

In 1998, the North Carolina Department of Transportation (NCDOT) implemented stream restoration as mitigation for unavoidable impacts associated with the construction of highway projects. Stream restoration is the reestablishment of stream functions (to the maximum extent practicable) by restoring the stream's natural pattern, dimensions, profile, riparian areas, and stability. A clear understanding of the watershed dynamics and the land use patterns adjacent to the stream is essential. Mitigation is required as part of the permitting process the department undertakes as part of the Clean Water Act.. Based on future transportation improvements, the NCDOT must provide approximately 400,000 linear feet of stream mitigation over the next four years and a total of approximately two million feet of stream mitigation in ten years.

The NCDOT is using several methods to achieve these goals. For example, a contract with the North Carolina Wildlife Resources Commission was initiated to restore 26,000 feet of streams in western North Carolina as part of the I-26 project. The NCDOT also purchased stream restoration credits from the

(Stream continued on page 2)



- We must continue to build trust and relationships with all partners. Trust combined with education will improve our quality of work and performance.

- We must be understanding of agency and public needs and address their concerns. This means there will be times of disagreement, but we will have to resolve the issues. Our department has excellent engineers, planners, and specialists who do great things for this state. We have the skills and technology to work with the agencies, pose ideas and develop solutions that produce win-win outcomes. We should collaborate, not negotiate.

●We must understand that what we create is the environment! Our products must be for the overall good of the state so that our children and children's children will inherit a better place than we did.

•A demonstration of stewardship founded on mutual respect with the agencies will far outdistance memoranda of agreement, memoranda of understanding and other streamlining techniques. The bottom line is that it's the people and relationships that get the job done.

■ A game warden in North Carolina had
■ arrested a man for killing and eating a
■ Red Cockaded Woodpecker. The man
■ went before the courts to plead his
■ case. After pleading guilty, the judge
■ asked him why he did it.
■ “I was just trying to feed my hungry
■ family” he said, “and I’ve never
■ harmed a woodpecker before in my
■ life.”
■ The judge, being a family man himself,
■ had a soft heart and agreed to let the
■ man go free, since he was only trying
■ to feed his hungry family and it was his
■ first and only offense.
■ “Before you go, though, I want to ask
■ you a question,” said the judge, “What
■ does Woodpecker taste like?”
■ “Well your Honor” the man replied,
■ “Its not as tender as Loggerhead
■ Turtle, but its better than Bald Eagle.”

North Carolina Wetland Restoration Program, which is part of the North Carolina Department of Environment and Natural Resources. The NCDOT design engineers are using natural channel design techniques to restore impacted streams adjacent to transportation projects as part of the overall project design and construction. The department's greatest stride in stream restoration is its proactive search of North Carolina's river basins to identify and obtain degraded streams to restore. It is through these efforts that the department will have restored almost 29,000 feet of degraded stream by the fall of 2000. The department's success in stream restoration has provided many benefits. The positive publicity the department has received has resulted in federal, state and local agencies identifying streams (and their owners) for potential stream restoration.

One of the important goals of NCDOT is to construct transportation projects while avoiding, minimizing, and/or mitigating environmental impacts. The NCDOT is committed to finding new and innovative ways to mitigate unavoidable stream impacts.



DNA Research Underway on Newly Discovered Freshwater Mussels

By: Tim Savidge

Tsavage@dot.state.nc.us

The North Carolina Department of Transportation (NCDOT) plans to relocate a portion of US 64 in Cherokee County near the town of Murphy, which involves crossing the Hiwassee River. Amidst the environmental assessment work for the project, biologists from NCDOT in cooperation with biologists from the North Carolina Wildlife Resources Commission (NCWRC) and the U.S. Fish and Wildlife Service (USF&WS) conducted mussel surveys. A number of mussel species were found; however, the identification of some mussel species is tricky.

Freshwater mussels are considered the most imperiled faunal group in North Carolina. Nearly seventy percent of the sixty recognized mussel species documented from the state are considered to be in some degree of peril. Six of these species receive protection under the Endangered Species Act. The cumulative effects of the modification of aquatic habitats through impoundments, channelization and dredging, along with sedimentation and water pollution has resulted in a dramatic decline of the North American mussel fauna in this century.

Shell characteristics of *Fusconaia* and *Pleurobema*, which are two distinct mussel genera, are very similar. The expertise, with respect to freshwater mussels, within the NCDOT is primarily with the fauna associated with Atlantic Ocean drainages. The Hiwassee River is within the Tennessee River Basin, which historically has the most diverse mussel fauna in the world. There are at least six species of *Fusconaia* and seven *Pleurobema* that occur in the Tennessee River Basin, some of which are federally protected. Most of these have not been recorded in North Carolina tributaries of the Tennessee River, such as the Hiwassee. The NCDOT sought out the opinion of other freshwater mussel experts, but a consensus could not be reached. To determine the identity of the mussels found in the Hiwassee River, the NCDOT attained research funding to have a DNA analysis done. Due to classification being based largely of morphological characteristics, the use of DNA classification is used only as a tool, and not as a sole resource in the identification of species.

NCDOT staff surveyed the river and about forty individual mussels were attained for analysis. A few individuals were sacrificed to provide voucher specimens; however, most of the sampling was non-lethal, using soft-part clippings.

The DNA sequences of the material collected from the Hiwassee River was then compared to the DNA of known species from various locations in the Tennessee River Basin. The preliminary results of this study indicate that both *Fusconaia* and *Pleurobema* are present in the Hiwassee River. The DNA of the *Pleurobema* specimens from the Hiwassee compared, or “cluster” very tightly with *Pleurobema oviforme* (Tennessee pigtoe) from other locations. The *Fusconaia* samples “cluster” loosely with *Fusconaia subrotunda* (longsolid mussel) from other locations. This loose clustering suggests that the Hiwassee specimens are genetically different than the known longsolid mussel populations that were examined. The longsolid was formerly believed to have been extirpated from North Carolina. Further analysis needs to be taken to determine if the genetic differences exhibited in the Hiwassee population warrant taxonomic separation from *Fusconaia subrotunda*.

The Tennessee pigtoe is a Federal Species of Concern, which means the species is being considered for listing as Endangered or Threatened. It is possible this species will be listed in the near future as a federally protected, threatened or endangered species. Currently in Cherokee County, the Hiwassee River is home to the Hellbender salamander, sicklefin redhorse fish, and two crayfish species, all of which are being considered for listing.

The investigations undertaken for this project have demonstrated the aquatic fauna of the Hiwassee River is as diverse as it is imperiled. The ecological significance as well as the sensitive nature of this fauna will need to be taken into consideration during the planning, design and construction phases of this highway project.

Methods for Conducting Freshwater Mussel Surveys

By: Tim Savidge

Tsavage@dot.state.nc.us

Environmental specialists with the North Carolina Department of Transportation (NCDOT) use the following methods to determine if a federally listed freshwater mussel species occurs within a particular water body, which might be impacted by a NCDOT project. Detailed guidelines are available from the department. There are numerous ways to conduct surveys for mussel fauna, including a combination of the following methods.



Search for shell material – Numerous animals feed on freshwater mussels. Muskrats in particular leave middens of discarded shells at entrances to burrows, on logs, rocks, and along the streambank. Examination of these shell middens is a useful tool in surveying a water body. Overwash areas can also be searched for shells that have been deposited during storm events. **The absence of a particular species cannot be determined by solely looking for shell material. In many situations shell material is not easily found even though mussels are present. This method should be used in conjunction with other methods.**

Mask and snorkel – This is one of the most effective methods to visually search for mussels in the substrate. Water temperature, depth and clarity are limiting factors.

SCUBA – In waters that are too deep to use mask and snorkel, or wading methods, surveys should be done by SCUBA diving. Both visual and tactile methods can be preformed using SCUBA. The gear needed for SCUBA is cumbersome; thus surveys of very large areas are difficult using this method. This method is most effective for surveying relatively limited areas, such as project footprints.

Wading using view buckets – Clear-bottom view buckets can be used to observe the substrate by wading in the stream. This method is effective in clear shallow (<1m) waters, and is used most often when water temperatures are too cold for mask and snorkel surveys. Commercially manufactured view buckets cost approximately \$80-100. Make homemade buckets, using 3-5 gallon plastic buckets and Plexiglas (these are usually more cumbersome and less durable).

Wading using tactile methods – Wading and feeling by hand in the substrate for mussels is done when water clarity is poor, or if the target species is the type (such as dwarf-wedge mussel) found under submerged rootmats in the streambanks.

The amount and type of survey effort needed to determine if a project will impact a listed mussel species will vary among projects. For more information regarding survey techniques, contact Tim Savidge - Tsavage@dot.state.nc.us.



Full Delivery Wetland and Stream Mitigation Projects

By David C. Robinson, Ph.D., P.E.

Drobinson@dot.state.nc.us

Since 1995, when the first comprehensive analysis of wetland mitigation needs was undertaken, the North Carolina Department of Transportation (NCDOT) has attempted to satisfy its needs using a combination of in-house staff and environmental consultants. However, with the addition of stream mitigation requirements in 1997, it became clear that additional help would be needed. The NCDOT increased the number of on-call consultants from five to twelve. While this enhanced our ability to search for, plan and design mitigation sites, it did nothing to increase the ability to acquire property, since the department's right of way capability was already being strained in order to keep up with acquiring parcels for highway projects.

In 1998, the Board of Transportation adopted new procedures to allow the department to solicit competitive bids from private firms willing to search for potential mitigation sites, then acquire suitable sites, and complete plans and designs, grade and plant the sites, and monitor them for up to five years. The first "full delivery" project was for the Wilmington Bypass. The request for proposals to compensate for 433 acres of impacts was issued in December 1998, proposals were received in March 1999, and the selection of a firm was made in May 1998. Of the five sites proposed by the selected firm, three have been completed and are now being monitored, one is under construction, and one is being planned – the last site was a replacement for a site that dropped out at the request of the owner.

Five more full delivery projects (one for stream mitigation and four for wetland mitigation) were initiated before the end of 1999. One project was mitigation for 10,000 feet of stream impacts for a specific highway project, and the other four were for a total of 1,200 acres of wetland impacts in three river basins. Of the twenty-three firms short-listed for the five projects, proposals were received from only eleven firms. However, it looks like the needs will be met in all except a portion of one river basin.

To date, the Board of Transportation has approved one contract for the stream restoration project, and eight wetland mitigation contracts. If the experience with the Wilmington Bypass contract holds true for the other projects, there should be about 1,000 acres of wetland mitigation and 20,000 feet of stream mitigation ready for monitoring by the summer of 2001 – less than a year-and-a-half after the issuance of the requests for

proposals. This remarkable achievement will facilitate the permitting of important highway construction projects by having mitigation "in the ground" prior to the first acre of wetlands or first foot of streams being impacted.

1999 Annual Monitoring Reports

By: Beth Smyre

Bsmyre@dot.state.nc.us

The Natural Systems Unit compiles annual monitoring reports for each of the Department's mitigation sites. In 1999, reports for 35 mitigation sites across the state were compiled. The reports provide relevant information needed to determine if a mitigation site has been successful. This year members of each bio-team prepared reports, which allowed a more in-depth analysis of each mitigation site.

Reports for the 1999 active sites were recently distributed to representatives of the U.S. Army Corps of Engineers (Regional and Division offices), the North Carolina Division of Water Quality, the North Carolina Wildlife Resources Commission, the North Carolina Division of Coastal Management, and the National Marine Fisheries Service. Additional copies were also distributed to various NCDOT staff. Follow-up meetings were held with the resource agencies to discuss the reports. At these meetings, the resource agencies and NCDOT had an opportunity to comment on the success and/or failure of each mitigation site. The meetings are designed to provide NCDOT with guidance about the future monitoring of a site.

Two types of monitoring are conducted: hydrologic and vegetation. The type monitoring required depends upon the criteria set forth in the original mitigation plans and project permit condition for highway projects in which this site is debited. The hydrologic monitoring involves a system of wells that collect daily measurements of the groundwater levels. Vegetation monitoring involves the identification of tree density and/or percentages of ground cover, which requires field surveys. Mitigation sites are deemed successful only when hydrologic and vegetation monitoring have shown success for a minimum of three to five years.

Unique Section 404 Commitments for the Final Section of I-26 in Madison County, North Carolina

By: Phillip Todd

Ptodd@dot.state.nc.us

The North Carolina Department of Transportation (NCDOT) is constructing the final section of I-26 in Madison County, North Carolina. The project lies on new location through the North Carolina mountains and crosses a relatively undisturbed area, including trout streams. The U.S. Army Corps Section 404 Individual Permit included two unique special conditions: compensatory mitigation for impacts to trout streams, totaling 25,000 feet, and environmental monitoring during project construction.



In December 1996, the NCDOT and N. C. Wildlife Resources Commission (NCWRC) entered into an agreement to enhance trout streams. The NCDOT and NCWRC organized a Mitigation Review Team (MRT) consisting of regulatory and other resource agencies. The purpose of the MRT was to solve problems associated with implementing this new, ambitious, mitigation concept.

The MRT decided the best manner to gage and stimulate interest in stream work was to hold a public meeting and raise public awareness of the purpose and benefits of stream mitigation. With the assistance of the Natural Resources Conservation Service and Madison County Soil and Water Conservation District, the public meeting yielded an extraordinary amount of interest. More information about the MRT can be found in a paper entitled "Stream Mitigation for I-26 – Madison County" at [http://www.dot.state.fl.us/emo/sched/ICOWET_III.htm].

The first two mitigation projects were implemented during the fall of 1999, and two additional projects are scheduled for implementation during the spring/summer of 2000. These four projects will yield 9,175 feet of stream mitigation of the 25,000 feet required under the permit special condition. The additional mitigation will come from other landowners who

expressed interest at the public meeting.

The second permit condition refers to the department's efforts to monitor streams located in a project area on which potential adverse effects of acid producing rock and stream turbidity/sedimentation may occur. In lieu of this condition, a contingency plan for immediate and long-term responses to acid rock and stream turbidity/ sedimentation was developed.

Three NCDOT branches are involved in the environmental monitoring process. The Geotechnical Unit, Roadside Environmental Unit (REU), and Project Development & Environmental Analysis Branch (PDEA) gathered baseline data at least one year prior to construction. The Geotechnical Unit conducts water and rock sampling programs to identify and control any contamination problems (such as acid rock) that may arise during and after construction. The REU will manage all land disturbing activities so that erosion and sedimentation are controlled and contained. They also will administer an in-house water quality monitoring program along the waterways within and near the project area streams. The PDEA will conduct benthic/fish sampling and water quality surveys on streams crossed by the project construction and on two control streams. These monitoring programs will continue for one year after construction has been completed.

Monthly reports will be generated for the continuous testing of acid rock and stream turbidity/ sedimentation. Biannual reports will be produced for benthic/fish samplings and water quality surveys. The NCDOT and resource agencies will meet biannually to discuss these reports.



**A Research Project: Low Light
Impediment of Fish Migration
With Particular Emphasis on
River Herring**

By: V.C. Bruton, Ph.D.,
Cbruton@dot.state.nc.us

The Center for Transportation and the Environment (CTE) is located at North Carolina State University. It was established in cooperation with the U. S. Department of Transportation (USDOT) and the North Carolina Department of Transportation (NCDOT) to investigate methods of insuring a healthy environment and in conjunction with transportation needs. CTE recently funded a research project in cooperation with the NCDOT to determine if road culvert crossings in streams represent a barrier to fish migration. The highway research project entitled Low Light Impediment of Fish Migration with Particular Emphasis on River Herring focused on low light as a potential impediment to upstream migration of adult river herring.

Dr. Mary Moser, the principle investigator for the project currently holds a position with the National Marine Fisheries Service in Washington State. However, during this research study (July 1997 to September 1999) Dr. Moser was a Research Associate at the Center for Marine Science Research, University of North Carolina at Wilmington (UNCW). Much of her research interest centers on fish collection, identification and culture.

Anadromous fish spend the majority of their lives in salt water, and migrate upstream into fresh water for spawning purposes. Blueback herring, Alosa aestivalis and alewife, A-pseudoharengus are two anadromous species collectively known as River Herring. Historically herring have been important commercial fisheries in North Carolina. The decline in fish catches along with concerns that culvert construction practices may be impeding fish movement, were principle reasons for funding this 26-month research project.

The apparent decline in anadromous herring in stream stretches with culverts raised concern among the permitting agencies. However, the NCDOT considers culverts a cost-effective method for replacing low bridges. The study targeted six-foot diameter culverts, steel reinforced concrete box culverts, RCBC arch structures, bridges over one meter above the waterline and bridges one meter or less above the waterline. Sites were selected from streams in the Albemarle and

Pamlico Sound regions and drainage's of the Cape Fear River. Selection of sample sites was also based on historical occurrences and prior knowledge of herring using these streams.

Studies were conducted using gill nets to provide accurate identification of fish species, count and direction of movement. Two different methods of light measurements were used – stationed and hand-held meters. Stationed meters were used for around the clock measurements, and hand-held meters provided a real time comparison. The measurements were taken above the water and four inches below the water surface at both ends and in the middle of the throughway.

Observations confirmed the six-foot diameter culverts and bridges less than one meter above the water surface level were significantly darker than the other structures. The results showed low light levels do have some effect on fish activity. However, other factors cannot be ruled out in contributing to a decline in anadromous fish populations.

If you would like additional information, please contact Ms. Katie McDermott, CTE Technology Transfer Director at 919-515-8034 or kmp@unity.ncsu.edu

Answers to Puzzle

Sod Mat	Drain Field
Silt Fence	Mountain Bog
Violation Notification	Lynx Rufus Bobcat
Canopy Layer	Compensatory Mitigation
Indiana Bat	Wetland Delineation
Endangered Species	Rootwad Bank Stabilization
Preferred Alternative	Bog Turtle
Cove Forest	Salt Flat
Red-Cockaded Woodpecker	Mesic Soil
Marine Fisheries	Fire Ant
Tidal Marsh	Seed Bed
Mitigation Bank	Gleyde Soil color
Oak Fruit Acorn	Swamp Forest
Muck Soil Layer	Water Budget
Fiber Matting	Bald Eagle
Compensatory Mitigation	Nationwide Permit
Barrier Island	Flora and Fauna
Environmental Impact Statement	Peat Moss
Understory Vegetation	Dwarf Wedge Mussel
Areobic Respiration	Tulloch Rule
Highway Runoff	Hemlock Bluff
Habitat Enhancement	Hydric Soil
Leaf Litter	

Quick Robin—To The
Echinoptera Mobile
(Bat Mobile)

By: Logan Williams
Ljwilliams@dot.state.nc.us

A small colony of Indiana bats, *Myotis sodalis*, a federally endangered species, was discovered in July 1999 on the Cheoah Ranger District of the Nantahala National Forest in Graham County, North Carolina. Indiana bats are small flying mammals with dull grayish chestnut fur. They weigh about three-tenths of an ounce and have a wingspan of nine to eleven inches. The Indiana bat requires caves or mines for winter hibernation. They primarily use standing dead trees with degrading bark or live trees with loose bark for summer lodging and maternity colonies, with a preferred location in flood plains or near streambeds. The bats feed on insects, such as moths, beetles, flies, wasps, bees, flying ants, and mosquitoes. Bats are the only major predators and the best natural controller of night flying insects.

The Indiana bat population has declined drastically since the 1960s. Several factors have contributed to this decline, such as, low birth rate with

female bats producing only one or two young per year; and human disturbance in and around hibernating sites, where as many as 80,000 bats may spend the winter. Disturbances, including vandalism, may result in a high number of deaths. Clearing and fragmentation of forests used for summer habitat has also contributed seriously to the decline.

The USFWS has identified four counties in western North Carolina where the Indiana bat is likely to be found. These include Graham, Cherokee, Macon and Swain Counties. The NCDOT has twenty projects that could potentially impact Indiana bat habitat. Several bat experts have been hired to conduct surveys on transportation projects and evaluate possible impacts to bat habitat.

Under the Endangered Species Act, the U.S. Fish and Wildlife Service (USFWS) notifies other agencies where listed species may be located. This allows an agency to evaluate impacts on threatened and endangered species. The law also requires all agencies not to jeopardize the existence of federally listed species and to aid in their recovery.

Centerline
Detour

Study the list, where the first or last word(s) of the 44 phrases wait for their mates. The numbers in parenthesis indicate the number of letters in the missing word. Once you've searched and found all the missing words reading across, down, forward, backward, and diagonally, the letters not used will reveal a simple message.

- | | | |
|-------------------|-------------------|------------------------|
| (3) Mat | (5) Field | (4) Fence |
| Mountain (3) | (9) Notification | Lynx Rufus (6) |
| (6) Layer | (12) Mitigation | Indiana (3) |
| Wetland (11) | Endangered (7) | (7) Bank Stabilization |
| Preferred (11) | Bog (5) | (4) Forest |
| (4) Flat | Red-Cockaded (10) | (5) Soil |
| Marine (9) | Fire (3) | (5) Marsh |
| (4) Bed | Mitigation (4) | (6) Soil color |
| Oak Fruit (4) | (5) Forest | (4) Soil layer |
| (4) Budget | (4) Matting | (4) Eagle |
| Compensatory (10) | Nationwide (5) | (7) Island |
| Flora and (5) | Envir. Impact (8) | (4) Moss |
| (10) Vegetation | Dwarf Wedge (6) | (7) Respiration |
| (7) Rule | (7) Runoff | (7) Bluff |
| Habitat (11) | (4) Soil | Leaf (6) |

T H D L A B H C O L L U T E M U C K
B N E I A A T U R M F A R L E S C C
O A L T E R N A T I V E Y S S T A O
B E I T M R S U B T T N I T I N L
C O N E I I T E H A T H E S C N O M
A C E R D E R O W G L E Y E D T P E
T L A S D R E A L A S W C I R D Y H
I S T A T E M E N T B T D C H R E D
S E I R E H S I F I C O O E C Y K A
W D O E S D W O A O S O G P D R W P
A E N C E E K E U N D E R S T O R Y
M U S S E L R S N E R N D A O T N A
P N G E D T I D A L A R E D D A O W
S P C P E R M I T E I C P I E S I H
S S I E W U A M P F N E O R E N T G
S T B A T T N E M E C N A H N E A I
R O O T W A D D W K A R C F W P L H
E D R L G E M U E N S S O E L M O A
N D E I V I O R L A A T R I O O I N
N O A S T I F I C B A T N I O C V N

Employee Spotlight

By: Locke Milholland

Shannon Simpson

Shannon Simpson is an Environmental Systems Specialist with the Natural Systems Unit of the Project Development and Environmental Analysis Branch. She has worked with NCDOT for two and a half years.

Shannon is originally from Greensboro, North Carolina, and graduated from the University of North Carolina-Asheville, with a Bachelors of Science degree in Natural Resources Management. She is taking classes at North Carolina State University through the department's continuing education program, and may pursue a graduate degree.

Shannon participates in field analysis and biological studies. She works in Gordon Cashin's team and her duties include handling permits and mitigation, monitoring mitigation sites, and helping with the Tulula Bog mountain restoration site. Shannon was also an instructor for an arc view course for the Natural Systems staff to help them use this mapping software more efficiently.



Beth Harmon



Beth Harmon has worked with the Department of Transportation for eight years. She worked in the Division Five office for one year and the remaining seven years have been with the Project Development and Environmental Analysis Branch. Beth also worked with a private consulting firm that concentrated in geotechnical work before joining NCDOT. She is a native of Greenville, North Carolina and has a Bachelors of Science degree in Urban and Regional Planning from East Carolina University.

Beth Harmon's primary responsibility in the Natural Systems Group is to track and monitor projects on the twelve-month let list and prepare status reports. The status reports for projects on the twelve-month let list indicate whether permits have been submitted or received. Beth provides updated permit status reports to numerous NCDOT staff so project schedules can be maintained. Beth also works with various private-consulting firms and is responsible for handling contracts and invoices.

Contact Information

NCDOT
Project Development &
Environmental Analysis

Main Office: (919) 733-3141

Fax: (919) 733-9794



Contact Information

Newsletter coordinators

V. Charles Bruton, Ph.D.:
(919) 733-7844 (ext. 308)
cbruton@dot.state.nc.us

J Locke Milholland:
(919) 715-5485
jlmilholland@dot.state.nc.us

Linda Hilton-Cain:
(919) 250-4092
lhilton@dot.state.nc.us

Our Mission Statement

Each of the teams in the Natural Systems Unit is responsible for natural resource investigations, obtaining environmental permits, developing wetland and stream mitigation plans, and implementing the construction of mitigation sites.

500 copies of this newsletter were produced by the North Carolina Department of Transportation at a cost of \$.29 each

NC Department of Transportation
1548 Mail Service Center
Raleigh, NC 27699-1548